

X. Observations of the Variations of the Needle and Weather, made in a Voyage to Hudson's-Bay, in the Year 1731, by Capt. Christopher Middleton, communicated to the Royal Society by Mr. Benjamin Robins, F. R. S. with a Letter to Mr. Robins.

Months and Days.	Hours.	Barom. Alt.	Therm. Alt.	Lat. p. Davis, or Ac.	Lat. per Elton.	Obf.	Long.	Need. Variat.	Obf.	Winds.	Weather.
1731	9									E N E.	
June 14	12	30	26	59.17			5 ^d .52	17.30		S E.	Fair and Close.
	9									S E b E.	Dit.
	15	9	32	25							Fair and Close.
	12	31	25		59.24	Obf.	8 ^d .58	18.		E S E.	Dit.
	9	32	24							Dit.	Dit.
	16	9	32	24						E S E.	Dit.
	12	32	24.3	59.30			11.50	19.		Dit.	Dit.
	9	32	24 $\frac{1}{2}$							Dit.	Dit.
	17	9	31	24						S E b S.	Dit.
	12	31	24 $\frac{1}{2}$	59.35			15.10	20.		Dit.	Dit.— at 2 small Rain.
	9	31 $\frac{1}{2}$	24							S b W.	Dit.
	18	9	31	24						S W.	Cloudy with small Mist.
	12	30	24	59.29			18.45	21.		S W b S.	Foggy, with small Rain.
	9	29	23							N N W.	Fair and clear, but cloudy.
	19	9	31	25						Dit.	Clear, with Clouds.
	12	31	25	58.54	58.52	Obf.	21.15	21.30		Dit.	Hazy, with small Rain.
	6	30	24							N b E.	Fair and Clear.
	20	9	30	24	Acc.					S E.	Clear, with small Rain.
	12	30	24 $\frac{1}{2}$	58.47	58.55	Obf.	24.11	22.		Dit.	Fair and Cloudy.
	9	29	24							S E b S.	Foggy, fresh Gales & Rain.
	21	9	27	24						S E.	Fresh Gales, with much Rain
	12	26	24	58.47			29.13	24.		Dit.	Dit.
	9	25	24							Dit.	Little Wind and foggy.
	22	9	25	24	Acc.					E S E.	Dit.— with small Rain.
	12	24	23 $\frac{1}{2}$	58.42	58.47	Obf.	32.54	26.	Obf.	S E b E.	Foggy.
	9	24	23 $\frac{1}{2}$							E S E.	Dit.
	23	9	26 $\frac{1}{2}$	25						N E b E.	Fresh Gales, hazy & misty.
	12	28	25	58.38			36.55	26.		E N E.	Dit.
	9	30	26 $\frac{1}{4}$							Dit.	Fresh Gales, with Clouds.
	24	9	30	26 $\frac{1}{4}$						E S E.	Fair, with little Winds.
	12	29	25 $\frac{1}{2}$	58.37		Obf.	40.56	27.30		Dit.	Dit.
	9	28	25 $\frac{1}{2}$							Dit.	Dit.
	25	9	28	25 $\frac{1}{4}$						E b S.	Light Winds & fair Weather.
	12	27	25	58.32		Obf.	43	30.	Obf.	Dit.	Fair and Clear.

Months and Days.	Hours.	Barom. Alt.	Therm Alt.	Lat. <i>p.</i> <i>Davis,</i> or <i>A^{ct.}</i>	Lat. <i>p.</i> <i>Elton.</i>	Obf.	Long.	Need. Variat.	Obf.	Winds.	Weather.
June 25	9	28	25 $\frac{1}{4}$							N N W.	Cloudy.
26	9	32	28							W N W.	Clofe.
	12	34	29	57.39			43.17	29		W b N.	Hazy.
	9	31	27							S W.	Fresh Gales & hazy
27	9	33	28							N W.	Foggy.
	12	33	28	58.6			45.10	30		N W b N.	Thick and foggy.
	9	31	27							S E.	Hazy, with small Rain.
28	9	29	28							S S E.	Foggy, with much Rain.
	12	29	29	58.18			47.16	31		S W.	Hazy, with small Rain.
	9	32 $\frac{1}{2}$	29 $\frac{1}{2}$							W S W.	Fresh Gales, with Fogs.
29	9	33	29 $\frac{1}{2}$							W S W.	Little Wind, and hazy.
	12	33	29	58.29			47.41	31		S W.	Fair and clear ; some Rain.
	9	32 $\frac{1}{2}$	28 $\frac{1}{2}$							S S W.	Foggy and wet.
30	9	30	28 $\frac{1}{2}$							S b W.	Squally.
	12	29	28 $\frac{1}{2}$	58.53			51.16	33		Dit.	Fresh Gales, and hazy.
	9	28	29							S W.	Fresh Gales, Fogs, and Rain.
July 1	9	27 $\frac{1}{2}$	30 $\frac{1}{2}$							W b S.	$\frac{1}{2}$ 2 $\frac{1}{2}$ D. above chang. stormy
	12	31	30 $\frac{1}{2}$	59.49			54.56	34		West.	—fell 1 D. below chang. mod.
	6	32	30 $\frac{1}{2}$								—fell. Small Rain, & hazy.
2	9	32	30							Calm.	Calm. Somewhat hazy.
	12	32	28 $\frac{3}{4}$	60.16	60.16	Obf.	55.4	34		Calm.	—at a Stand, fair and calm.
	9	32 $\frac{1}{2}$	29							Dit.	—somew. fall. light, & clear.
3	9	33	30							North.	Clofe and grey Weather.
	12	33 $\frac{1}{2}$	31	60.08			56.22	34		N b E.	—contin. to fall, clear, & cold
	9	33	30 $\frac{1}{2}$							North.	—rising a little, fair & clear.
4	9	31	29 $\frac{1}{2}$							N N W.	—rising, fair with fly. Clouds.
	12	30	29	59.33	59.33	Obf.	58.10	37	Obf.	N W.	—rising, lit. Wind, & sm. Rain
	9	29	28 $\frac{1}{2}$							North.	Clofe, lit. Winds & fly. Clouds.
5	9	30	29							N W b N.	Light Air, and variable.
	12	31	28 $\frac{1}{4}$	59.33			58.28	37		Calm.	—fallen, fair and clear.
	9	31	28							Dit.	—at a stand, fair Weather.
6	9	31	28 $\frac{1}{2}$							N N W.	—at a stand, clofe, & lit. Winds
	12	31	29	60.2			58.40	37		N N W	—at a stand, little Winds.
	9	31	29							N E.	—at a stand, clofe, & cloudy.
7	9	31 $\frac{1}{2}$	30 $\frac{1}{2}$							N N E.	—some. fall. clear w. Clouds.
	12	31	30	60.9			60.22	37.40		Calm.	Clofe and grey Weather.
	9	30 $\frac{1}{2}$	29						Obf.	S W.	—rising, lit. Wind & hazy.
8	9	31	29 $\frac{1}{2}$							S E.	Clofe and foggy.
	12	31	30	60.29	60.30	Obf.	61.23	38		N E.	Dit.
	9	31	29							W b N.	Dit.
9	9	34	34							S W b S.	—fallen 4 Deg. clear & cold.
	12	34	33 $\frac{1}{2}$	61.16	61.19	Obf.	63.57	38	Obf.	Dit.	Fair, clear, much Ice in sight.
	9	33	32								—rising, fair and clear.
10	9	32	32	Acc.						E S E.	—rising, fair and clear.
	12	32	32	61.35	61.25	Obf.	65.17	40		Dit.	—at a stand, fair and clear.

Months and Days.	Hours.	Barom. Alt.	Therm. Alt.	Lat. p. Davis, or A ^{ct} .	Lat. p. Elton.	Obf.	Long.	Variat.	Obf.	Winds.	Weather.
July 10	9	32	32								stands, fresh Gale.
11	9	34	33	Acc.						S E b S.	—fallen, fresh G. with Squalls
12	9	34	33	62	62.4	Obf.	69.2	41		S E b S.	—at a stand, fresh Gales.
	9	34	33							Dit.	—at a stand, hazy.
12	9	37	32							Dit.	—fallen, fair.
12	9	36	30		62.33	Obf.	71.2	43		W S W.	—somewhat rising, fair.
	9	35	30							Dit.	—rising, little Winds, & fair.
13	9	35	29	Acc.						Dit.	—at a stand, fair with Calm.
12	9	35	30	62.46	62.40	Obf.	72.6	43		N W.	Fair and moderate.
	9	35	30							N W.	Fair and clear.
	9	35	32							Dit.	—at a stand, fair and clear.
14	9	35	32	62.30		Obf.	73.33	41		North.	—at a stand, fair and clear.
	9	35	32							N W b N.	Fair, serene Weather.
15	9	34	32	Acc.						South.	—somewhat fallen, foggy.
12	9	35	33	63.13	63.14	Obf.	75.9	41		S b E.	Very foggy.
	9	35	33							S E.	—at a stand, foggy.
16	9	35	33	Acc.						N W.	—at a stand, fair and clear.
12	9	35	32	63.21	62.58	Obf.	77.3	42		N N W.	Fair, serene Weather.
	9	35	31							Dit.	—falling, clear.
17	9	34	31							N W.	—rising, clear.
12	9	33	30	63.17			78.29	41		Dit.	—continues rising, clear.
	9	33	30							North.	—rising, serene Weather.
18	9	33	31	Acc.						N W.	Foggy.
12	9	34	31	63.9	63.6	Obf.	79.53	40		Dit.	—a little fallen, thick Fog.
	9	34	31							South.	—at a stand, hazy.
19	9	33	31							East.	—rising, fresh Gale.
12	9	33	30	62.14		Obf.	80.44			E b N.	—contin. rising fair, & clear.
	9	30	29							Dit.	—continues rising, serene.
20	9	28	27							West.	—rising, grey close Weather.
12	9	28	26	61.18			81.26	37		Dit.	—stands, fresh Gales, & foggy.
	9	30	29							N W.	—fallen, hazy.
21	9	32	30							North.	—falls, fair, and clear.
12	9	32	29	60.5		Obf.	83.2	34		N W.	—stands, fresh Gales, & fair.
	9	32	29							Dit.	—at a stand, squally.
22	9	34	31							N W.	—fallen, moderate, and fair.
12	9	34	31	58.4		Obf.	84.20	30		West.	—at a stand, fair.
	9	33	31							W S W.	—rises, dark and cloudy.
23	9	32	31							W b N.	—rising, dirty and Rain.
12	9	32	31	57.35			84.20	29		W b S.	—stands, foggy, & small Rain.
	9	33	32							N W.	—fallen, fresh breeze & cold.
24	9	37	34	Acc.						N W.	—fallen 4 Deg. inclos. w. Ice
12	9	37	33	56.13	56.20	Obf.	85.27	25		West.	—stands, foggy and much Ice
	9	36	32							Calm.	—rising, serene.
25	9	36	32	Acc.						S S E	—rising, hazy.
12	9	35	31	56.24	56.24	Obf.	85.27	24		East.	—continues rising, fair.
	9	35	32							S E b E.	—stands, hazy, and cold Air.
	9	35	33							S S E.	—somew. fall. hazy, & cold.

Months and Days.	Hours.	Barom. Alt.	Therm Alt.	Lat. per Account.	per Da- vis.	per El- ton.	Long.	Variat.	Obs.	Winds.	Weather.
July 26	12	36	33 $\frac{1}{2}$	55.39		55.33	85.40	24		N b E. N N W. E N E. E b N. N b E. N b W. N N W. S W. S W b W. S W.	☽ falling, Rain, & fresh Gales —stands, thick and rainy. —contin. falling, fair & cold. —stands, cold, & much Ice. —as above, fresh Gale, cold. —as above, moder. & hazy. —stands, moderate & fair. —rising, fair, pleas. Weather. —at a stand, cloudy w. Rain. —rising, Thunder and Rain. —rising, fresh Gales w. Rain.
27	9	36	34								—much fallen, moderate. —rising, fair and moderate. —contin. rising, fair, & fett. —rising, squally, with Rain. —as above, fair and moderate. —rising quick, fair. —contin. rising, warm & fair.
	12	37	35	54.23			85.48	24			
	9	37	35								
28	9	37	34 $\frac{3}{4}$	53.57				24			
	12	37	34 $\frac{1}{2}$								
	9	35	30								
29	9	35	30 $\frac{1}{2}$	53.29				25			
	12	34	31								
	9	33	31								
30	9	37	32							N N W.	
	12	36	29								
	9	35	29 $\frac{1}{3}$								
31	9	31	27								
	12	31	27								
	9	29	25								
Aug. 1	9	26	22								
Aug. 20	9	30	35							W N W. N N W. Dit. North. North. Dit. S W b W. Dit.	Hazy and moderate. ☽ stands, hazy. —stands, fresh Gales. —somewhat fallen, fair. —fallen. —falls, clear, serene, & cold. —rises, fair light Breezes. —stands, clear, and calm. —somewhat risen, calm. —rises, hazy. —contin. rising, fresh Gales. —rising, hazy, drops of Ra. Fair and moderate. Hazy. Hazy and close ☽ falls, foggy, and cold. —continues fallen, cold. —little rising. —fallen, moderate, and fair. —stands, fresh Gales. Hard Gales —fallen, fresh Gales. Hard Gales. —stands, moderate. —somewhat risen, fair. —stands, fair and moderate.
	12	33	27	52.40		52.42			Obs.		
	9	35	30								
21	9	36 $\frac{1}{2}$	30								
	12	37	31	52.54	52.55				Obs.		
	9	37	30 $\frac{1}{2}$								
22	9	36	28								
	12	36	29	52.57	52.59				Obs.		
	9	35	29								
23	9	34 $\frac{1}{2}$	29							S S E. Dit. S b W. S E. S E. N E. N N E. Dit. Dit. E S E.	
	12	34	29	53.54							
	9	33	30								
24	9	32	28 $\frac{1}{2}$								
	12	32	29	55.16				25			
	9	33	30								
25	9	34	30 $\frac{1}{2}$								
	12	35	31	55.48				26			
	9	34	31								
26	9	36	33								
	12	36	33	56.55	56.56	56.56		28	Obs.		
	9	37	34								
27	9	40	34								
	12	40	34	58.14	58.13			29	Obs.		
	9	40	34								
28	9	38	33								
	12	38	32	58.35	58.41			30	Obs.		

Months and Days.	Hours.	Barom. Alt.	Therm Alt.	Lat. Acc.	Lat. p. Davis.	per Elton.	Long.	Variat.	Obs.	Winds.	Weather.
Aug. 28	9	38	32							North.	Fair and calm.
29	9	37	31							Dit.	Fair and clear.
	12	37	30	59.24	59.33			31	Obs.	N b W.	2 little risen, fair.
	9	36	30							West.	—stands, fair Weather.
30	9	36	31							Calm.	—stands, variable.
	12	37	30	59.55	60.5			31	Obs.	E S E.	—somewhat fallen.
	9	37	30							E b N.	—stands, squally.
31	9	39	35							E N E.	—fallen, fresh Gales.
	12	40	37	59.55				32		Dit.	—cont. fallen, fr. Ga. & clou.
	9	40	37							Dit.	—stands, squally.
Sept. 1.	9	40	36							N E.	—stands, great Sea.
	12	40	36 $\frac{1}{2}$	59.25				31		Dit.	
	9	41	36								
2	9	42	36 $\frac{1}{2}$							E N E.	—fallen, flying Clouds.
	12	43	36 $\frac{1}{2}$	59.43	59.36			32	Obs.	Dit.	—contin. falling, moderate.
	9	42	34							N N W.	Moderate.
3	9	41	35							S W.	—rising, fresh Gales.
	12	40	35 $\frac{1}{2}$	60.40				33		Dit.	—contin. rising, hard Gales.
	9	35	35							Dit.	—rising fast, very hard Gales.
4	9	32 $\frac{1}{2}$	32 $\frac{1}{2}$							Dit.	—still rising, blow. ver. hard
	12	31	33	61.33				35		Dit.	—continues rising, foggy.
	9	30	33							W S W.	Thick Fog.
5	9	34	33							N b E.	c fallen, fresh Gales.
	12	37	35	62.12				38		Dit.	Fresh Gales.
	9	38	35 $\frac{1}{2}$							Dit.	—continues fallen, moder.
6	9	42	37							N E b N.	—stands, hazy, Snow.
	12	42	36 $\frac{1}{2}$	62.37	62.49			42	Obs.	Dit.	—stands, thick Weather.
	9	42	36 $\frac{1}{2}$							S E.	—the same.
7	9	42	37								Cont. hazy, w. Ledges of Ice.
	12	42	37	63.10	63.21			42	Obs.	S E.	Dit.
	9	42	36 $\frac{1}{2}$							Dit.	The same, Fogs and Freez.
8	9	41	36							E S E.	2 somewhat risen, foggy.
	12	41	35 $\frac{1}{2}$	63.25				41		Dit.	—stands.
	9	41	35							Dit.	—the same, fair.
9	9	41	35							Calm.	—the same.
	12	40	34 $\frac{1}{2}$	63.19	63.13			40	Obs.	N W b W.	—somew. risen, fair.
	9	41	35 $\frac{1}{2}$							Dit.	—fallen, fair.
10	9	42	37							N b W.	—continues fallen, fair.
	12	42	38	62.48	62.30			41	Obs.	Dit.	—the same.
	9	43	38							Dit.	—fallen, fair.
11	9	44	38							Dit.	—fallen, fair.
	12	45	38 $\frac{1}{2}$	61.43				40		Dit.	—contin. fallen, fair & cold.
	9	45	38							North.	—at a stand, fair.
12	9	44	37 $\frac{1}{2}$							W N W.	—risen, fair.
	12	42	36 $\frac{1}{2}$	61.31	61.29			40	Obs.	West.	—risen, hazy w. much Ice.
	9	41	36							Dit.	—rising, fair and clear.

Months and Days.	Hours.	Barom. Alt.	Therm. Alt.	Lat. A ^c .	Lat. p. Davis.	Lat. p. Elton.	Long.	Need. Variat.	Obs.	Winds.	Weather
Aug. 13	9	40 $\frac{1}{2}$	36							N W.	Fair.
	12	40	36	61.16	61.5		60.18	38	Obs.	Dit.	Fair and moderate.
	9	40	36								& the same, cloudy.
14	9	40	35 $\frac{1}{2}$							N W.	—the same, fair.
	12	39	35	60.36			57.12	38		Dit.	Fair and cloudy.
	9	38	35							N W b N.	—rising, hazy, with Snow.
15	9	37	35 $\frac{1}{2}$							N N E.	—risen, foggy.
	12	37 $\frac{1}{2}$	36	59.41	59.28		52.29	35	Obs.	Dit.	Fair.
	9	37 $\frac{1}{2}$	35							N W.	
16	9	37 $\frac{1}{2}$	34 $\frac{1}{2}$							West.	—stands, cloudy.
	12	37 $\frac{1}{2}$	33 $\frac{1}{2}$	58.20	58.10		47.18	33	Obs.	N W b W.	—the same, cloudy.
	9	37 $\frac{1}{2}$	33 $\frac{1}{2}$								—stands, variable.
17	9	37	33							N N W.	—the same, cloudy.
	12	37 $\frac{1}{2}$	33 $\frac{1}{2}$	57.15			43.44	29		Dit.	—somew. fallen, cloudy.
	9	37	33							Dit.	Calm.
18	9	27	28 $\frac{1}{2}$							S W.	—rising quick, fresh Gales.
	12	26	28 $\frac{1}{2}$	56.35	56.25		42.32	27	Obs.	Dit.	—little rising, cloudy.
	9	26	28 $\frac{1}{2}$							West.	—stands, squall. with Rain.
19	9	34	29							N W.	Clear, with fresh Gales.
	12	35	30	55.23	55.29		38.48	25	Obs.	Dit.	—still falling, fair.
	9	35	31							Dit.	—stands, fair, squally.
20	9	34	30 $\frac{1}{2}$							W N W.	—rising, squally with Hail.
	12	33 $\frac{1}{2}$	31	54.23			34.19	22		Dit.	Hard Squalls.
	9	33 $\frac{1}{2}$	31								—at a stand, hard Squalls.
21	9	33	30							N W.	Squally with fresh Gales.
	12	33	29 $\frac{1}{2}$	53.9			29.51	20		Dit.	—stands, clear fresh Gales.
	9	34	29							Dit.	—somewhat fallen.
22	9	34	28 $\frac{1}{2}$							N b W.	—stands, fair.
	12	35	28	52.7	52.14		26.25	19	Obs.	N W b W.	—fallen, clear.
	9	30	25							S W.	—rising quick, cloudy.
23	9	28	25							S b E.	—still rising, hard Gales.
	12	24	24							Dit.	—rising quick, thick & dirty
	9	21	21								—continues rising.
24	9	22	22							East.	—stands, cloudy and Rain.
	12	22 $\frac{1}{2}$	22 $\frac{1}{2}$	52.30			23.12	17		Dit.	Dit. fresh Gales.
	9	22 $\frac{1}{2}$	22 $\frac{1}{2}$							Dit.	—at a stand, cloudy.
25	9	21 $\frac{1}{2}$	22							South.	—rising, squally and Rain.
	12	21 $\frac{1}{2}$	22	51.50	51.54		20.24	16	Obs.	Dit.	—the same, fresh Gales.
	9	21	22							W S W.	—the same, squally w. Rain.
26	9	21	21 $\frac{1}{2}$							S W.	Fair, fresh Breeze.
	12	21	21 $\frac{1}{2}$	50.38	50.46		17.12	16	Obs.	S b W.	Fair and clear.
	9	21	21.							Dit.	—the same, fresh Gales.
27	9	22	21.							West.	—lit. fallen, fair and cloudy.
	12	23	20 $\frac{1}{2}$	49.28	49.28		13.26	15	Obs.	Dit.	Fair.
	9	22	20							S W.	A great Sea, squally.

Months and Days.	Hours.	Barom. Alt.	Therm Alt.	Lat. Ac.	Lat. <i>p.</i> <i>Davis.</i>	Lat. <i>p.</i> <i>Elton.</i>	Long.	Need. Variat.	Obf.	Winds.	Weather.
Aug. 28	9	20	19							S W.	☉ rising, fresh Gales & Rain.
	12	19	18	49.15	49.2		9.21	14	Obf.	Dit.	—contin. rising, fresh Gales.
	9	21	18 $\frac{1}{2}$							W S W.	—little fallen, fair Weather.
29	9	23	18 $\frac{1}{2}$							S b W.	—fallen, hazy, fresh Gales.
	12	22	18	49.32			5.18	14		Dit.	
	9	22	18							S W b S.	—at a stand, fresh Gales.
30	9	22	18							Dit.	—the same, hazy.
	12	22	18	49.18	49.30			14	Obf.	S W.	—at a stand, hazy.
	9	22	18								—contin. the same, squally.
Oct. 1.	9	24	17							West.	—fallen, fair and clear.
	12	26	19	50.2				14		W S W.	—continues fallen, fair.
	9	28	21							Dit.	—fallen, fair and clear.
2	9	29	21							Dit.	
	12	29	21							Dit.	—continues, pleasant.
	9	30	22							Dit.	—the same, fair and clear.

January 28, 173 $\frac{1}{2}$.

S I R,

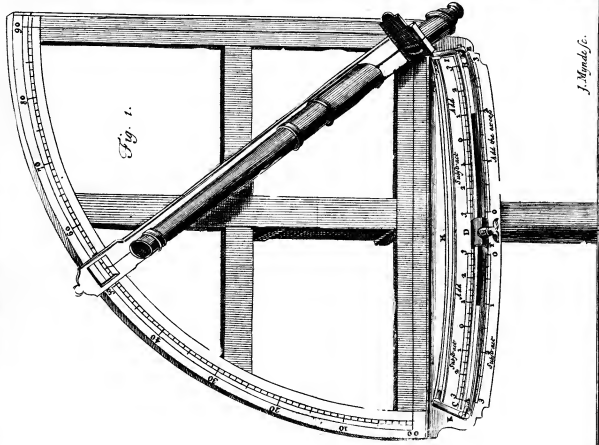
THESE will inform you of my Sentiments concerning Mr. Patrick's Marine-Barometer, which I have made use of for two Voyages to *Hudson's-Bay* in North America, and by the strictest Observations, I have always found it to give me timely Notice of all bad Weather, and likewise of veerable Winds; as also, certain Intelligence of our coming nigh any Ice, with the Quantity we had to go through. It is an Instrument of excellent Use, I having continually found myself obliged to conform to its more certain Information before all other ocular Appearances in the Horizon whatever. I must likewise inform you, that when we come in or near Ice we are obliged to keep one of our Compasses continually moving, there being either some magnetick Particles in the Air, or some other Quality that hinders them from traversing, which makes our Course very difficult to direct; this happens generally in our entring *Hudson's-Streights* and Bay, but never so without being near or amongst Ice. I have enquired of the Commanders, and others that use *Greenland* and *Davis's-Streights*, and find great Complaints from them of their Compasses not traversing. I have tried the Needle of the Azimuth Compass without the Chart, and find it to traverse much better, so that I design next Voyage to have iceing-glass Charts, as being lighter. I submit the Consideration of these Things to yourself and the Learned, and remain,

S I R,

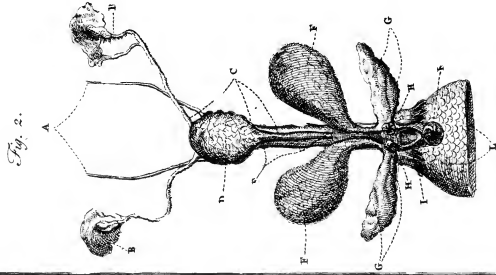
Your most Humble Servant,

Christopher Middleton.

To Mr. Benj. Robins.



J. Mondelet.



C. M. ad inst. delin.